

Compact Fluidic Actuator Arrays for Flow Control, Phase II

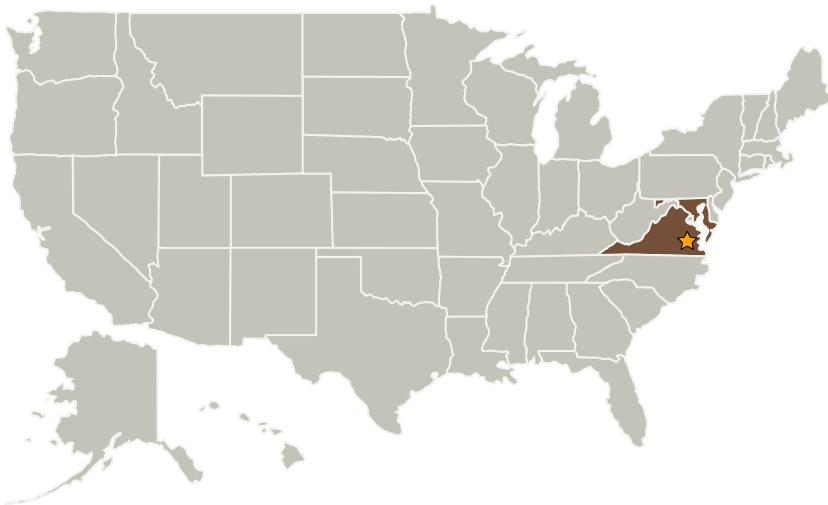
Completed Technology Project (2009 - 2011)



Project Introduction

The overall objective of the proposed research is to design, develop and demonstrate fluidic actuator arrays for aerodynamic separation control and drag reduction. These actuators are based on a compact design of low mass-flow fluidic oscillators that produce high frequency (1-5 kHz) sweeping jets. Preliminary experiments on separation control over a trailing edge flap on a NACA 0015 airfoil, V-22 wing section for download reduction, cavity tones and jet thrust vectoring have shown encouraging results for these actuators. Based on the results from Phase I, and the commercial interest from a leading aircraft manufacturer, we propose to conduct a systematic study of the scaling parameters of the fluidic actuator arrays in relation to the geometric and aerodynamic parameters of the wing using wind tunnel tests on a specially designed airfoil model. This will include the effects of actuator spacing, array location, pressure gradient and wing sweep on the actuator effectiveness. Failure Modes and Effects Analysis (FMEA) will be undertaken to estimate the risk of the proposed technology. A rapid inspection technique will be developed for conducting quick, in situ testing of the fluidic arrays. Projecting to the future, a synchronous array of actuators will also be developed.

Primary U.S. Work Locations and Key Partners



Compact Fluidic Actuator Arrays
for Flow Control, Phase II

Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Transitions	2
Project Management	2
Technology Areas	2

Organizational
Responsibility**Responsible Mission
Directorate:**

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

Compact Fluidic Actuator Arrays for Flow Control, Phase II

Completed Technology Project (2009 - 2011)




Organizations Performing Work	Role	Type	Location
★ Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Advanced Fluidics, LLC	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Ellicott City, Maryland

Primary U.S. Work Locations

Maryland	Virginia
----------	----------

Project Transitions

 **January 2009:** Project Start **June 2011:** Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.3 Aeroelasticity